

Claims

What is claimed is:

1. A combustion turbine engine suited to operation in response to a flow of high-temperature gas, the combustion turbine engine comprising:

5 an outer housing including walls that define an inlet, an outlet, and an inner surface;

an insulation cartridge disposed within the outer housing and defining an inner space, the insulation cartridge including a wall and a core and operable to at least partially thermally insulate the outer housing from the flow of high-temperature gas; and

10 a turbine rotor disposed substantially within the inner space and rotatable in response to the flow of high-temperature gas.

2. The turbine of claim 1, wherein the outer housing includes walls having an average thickness of at least one-half inch.

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3. The turbine of claim 1, wherein the outer housing includes a cast portion.

4. The turbine of claim 1, wherein the outer housing includes cast iron.

20 5. The turbine of claim 1, wherein the outer housing includes cast steel.

6. The turbine of claim 1, wherein the core of the insulation cartridge includes a ceramic insulating material.

7. The turbine of claim 1, wherein the wall of the insulation cartridge has an average thickness of less than about 0.150 inches.

5 8. The turbine of claim 1, wherein the wall of the insulation cartridge includes an alloy steel.

9. The turbine of claim 1, wherein the wall of the insulation cartridge substantially encapsulates the core.

10 10. The turbine of claim 1, wherein the core includes a layer of insulation that is at least about one-half inch thick.

11. A microturbine engine system operable to provide electrical power, the microturbine engine system comprising:

a compressor operable to produce a flow of compressed air;

5 a recuperator in fluid communication with the compressor to receive the flow of compressed air, the flow of compressed air being preheated within the recuperator to produce a flow of preheated compressed air;

a combustor receiving the flow of preheated compressed air and operable to produce a flow of products of combustion, the flow of products of combustion having a temperature that generates thermal forces and a pressure that generates pressure forces;

10 a turbine driven by the flow of products of combustion, the turbine discharging the flow of products of combustion to the recuperator to preheat the flow of compressed air;

a housing at least partially enclosing the turbine and including an inner surface;

15 an insulation cartridge positioned within the housing, the insulation cartridge at least partially isolating the housing from the flow of products of combustion such that the housing absorbs a majority of the pressure forces and the insulation cartridge absorbs a majority of the thermal forces; and

20 a generator coupled to the turbine, the generator driven by the turbine at a speed to output electrical power.

12. The turbine of claim 11, wherein the housing includes walls having an average thickness of at least one-half inch.

13. The turbine of claim 11, wherein the housing includes cast iron.

14. The turbine of claim 11, wherein the housing includes cast steel.

5 15. The turbine of claim 11, wherein the insulation cartridge includes a ceramic insulating material.

16. The turbine of claim 15, wherein the insulation cartridge substantially encapsulates the insulation.

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17. The turbine of claim 15, wherein the insulation is at least about one-half inch thick.

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18. The turbine of claim 11, wherein the insulation cartridge includes a wall that includes an alloy steel.

19. The turbine of claim 17, wherein the wall has an average thickness of less than about 0.150 inches.

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20. A method of assembling a turbine for use in a combustion turbine engine,
the method comprising:

providing a housing including an inlet, an outlet, and an inner surface;

forming an insulation cartridge having a wall that defines a core space;

5 positioning an insulating material within the core space;

inserting the insulation cartridge into the turbine casing; and

supporting a rotor for rotation within the housing.

21. The method of claim 20, wherein the providing step includes casting at
10 least a portion of the housing using a cast iron material.

22. The method of claim 20, wherein the insulating material includes a
ceramic material.

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